

CLAIMS

1. A stainless steel for a proton-exchange membrane fuel cell separator, having a composition comprising 0.03 mass % or less of C, 16-45 mass % of Cr, 0.03 mass % or less of N, 0.1-5.0 mass % of Mo, wherein a total of the C content and the N content satisfies 0.03 mass % or less; a balance portion is comprised of Fe and unavoidable impurities; with respect to Al, Cr, and Fe contained in a passive film on a surface of the stainless steel an atomic ratio of Cr/Fe is 1 or greater; and an atomic ratio of Al/(Cr+Fe) is less than 0.10.

2. A stainless steel for a proton-exchange membrane fuel cell separator, having a composition comprising 0.03 mass % or less of C, 0.03 mass % or less of N, 20-45 mass % of Cr, and 0.1-5.0 mass % of Mo, wherein a total of the C content and the N content satisfies 0.03 mass % or less; a balance portion is comprised of Fe and unavoidable impurities; with respect to Al, Cr, and Fe contained in a passive film on a surface of the stainless steel an atomic ratio of Cr/Fe is 1 or greater, and an atomic ratio of Al/(Cr+Fe) is less than 0.05.

3. A stainless steel for a proton-exchange membrane fuel cell separator according to any one of claims 1 and 2, wherein in addition to the composition, the stainless steel

comprises at least one selected from a group of items (1)-(4):

- (1) Si: 1.0 mass % or less;
- (2) Mn: 1.0 mass % or less;
- (3) Al: 0.001-0.2 mass % or less; and
- (4) Ti or Nb: 0.01-0.5 mass %; or a total of Ti and Nb: 0.01-0.5 mass %.

4. A stainless steel for a proton-exchange membrane fuel cell separator according to any one of claims 1 to 3, wherein, of oxygens contained in the passive film, an atomic ratio of $O(M)/O(H)$ between an oxygen $O(M)$ present in the state of a metal oxide and an oxygen $O(H)$ present in the state of a metal hydroxide is 0.9 or less.

5. A stainless steel for a proton-exchange membrane fuel cell separator according to any one of claims 1, 3, and 4, wherein the Cr content is 20 to 45 mass %.

6. A proton-exchange membrane fuel cell formed to comprise a solid polymer film, an electrode, and a separator, wherein the stainless steel according to any one of claims 1 to 5 is used for the separator.